An Example of a Measure for Increased Confidence in Authentication

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Authenticating an Instrument: Several Aspects

- **Demonstrate that hardware and software contain the agreed elements and nothing else.**
- **Demonstrate that the system functions as it should.**
- **Demonstrate that the system remains unchanged since the last authentication.**
- **Other considerations.**

The emphasis in this part of the demonstration is on the second aspect:

—*demonstrate that the system functions as it should*.

Authentication Sources

- **The authentication sources were chosen to provide confidence that the system is functioning according to specifications.**
- **In an eventual measurement regime, the sources themselves may require authentication.**
- **For this demonstration, detailed analysis of the sources is not feasible owing to constraints of time, security, and the lack of an enabling agreement.**
- **However, it is possible to introduce the *concept* of authentication of the sources at this time.**

Authentication Sources

- During an earlier exchange, Russian representatives suggested the value of examining the authentication sources with an instrument of Russian origin.
- This cannot be done in the present demonstration for administrative reasons (without prejudice to the possibility of performing similar measurements in another venue).
- Instead, a U.S.–supplied and –operated instrument is available, and the data generated by it can be displayed. This is called the "independent measurement instrument" in this presentation.

Independent Measurement Instrument

- HPGe detector
- DART™ analyzer (functionally similar to the “Green Star” analyzer)
- Laptop computer running control and display software

All system components are commercially available.

Measurement Plan

- While the second AMS/IB authentication measurement is in progress, the source used in the first authentication measurement is available for examination with the independent measurement instrument.
- To save time and simplify the demonstration, calibration of the independent measurement instrument will already have been performed.
- U.S. personnel will control the instrument, but Russian Federation personnel are invited to direct acquisition, regions of interest, etc.
- The instrument will be removed before presentation of the weapon component.

Features That May Be Visible

- Pu presence: Region near 400 keV
- "Isotopic" region: 600–700 keV
  - Software for detailed isotopic analysis is not available.
  - ^{240}Pu line at 642.5 keV can be detected visually after a few minutes' counting.
  - To the experienced spectroscopist, spectrum "shape" is distinctive.
- Pu age: region near 330 keV
  - Analysis software not loaded.
  - Data difficult to interpret visually.
- Oxide indicator (871 keV) will be difficult to see.